4 Italy*

Paolo Malanima

At the beginning of the 1960s, two different views of the Italian Renaissance economy were proposed: the first by R. S. Lopez and H. Miskimin[1] and the second by C. M. Cipolla.[2] According to Lopez and Miskimin, the epoch of growth from the tenth century to 1300 was followed by a period of gloom. Decline in population, and especially urban population, industry and banking, characterized the Italian economy in the century after the Black Death. This "stagnationist"[3] approach was openly criticized by Cipolla. In his view, the Italian Renaissance was not an age of crisis or depression. After the Black Death, the population diminished considerably and, with it, both the agricultural and the non-agricultural product declined in absolute terms. Probably, however, according to Cipolla, population declined much more than output and, as a consequence, per capita product rose.

In the 1960s it was impossible to support the hypothetical suggestion by Cipolla and outline Italian per capita output during the Renaissance. Very little was known at the time about either product or population. Historical research has, however, made progress since then. Nowadays data on population and urban inhabitants are available for the whole of Italy; information on prices and wages is richer; research on agricultural output, the relationships between landowners and workers, and agricultural contracts is much more advanced. Only in the case of finance, commerce, and industry—once the central interest of historians dealing with the Italian economic renaissance—has progress been scantier in the last few decades. On the whole, in the case of Italy, it is possible to collect quantitative information on several economic variables since the end of the thirteenth century.

The focus in the following pages will be on the trend of product (per capita and aggregate) in agriculture, industry, and services. In all branches of activity, I will try to shed light on the production function; that is on output as a function of the level of technology (together with useful human knowledge), labor, capital, and natural resources. Since the efficiency of the economic system is a function not only of the technology, but also of the institutions, I will recall some of the main institutional changes.

From an economic viewpoint, as A. Sapori suggested in 1952, the Italian Renaissance lasted longer than it did from a cultural perspective. According to Sapori, the Renaissance economy spanned the period from the tenth or eleventh century to 1550.[4] Although this proposal is plausible, I will refer to the epoch traditionally defined as the Renaissance: that is from the second half of the thirteenth century to the second half of the sixteenth.

I will try a macroeconomic approach to the Renaissance economy, beginning in with the "Population" section. In the "Agriculture" and "The Non-agricultural Sectors," I will deal with the output of agriculture, followed by industry and services. In the section "The Product of the Renaissance Economy," the product of the three sectors will be combined to provide a complete view of per capita and aggregate product. An explanation of the main changes will be presented in the "Growth and Decline" section.

Since the available quantitative data especially concern the Center and the North, the following reconstruction will refer primarily to this part of Italy.

POPULATION

Trends and Density

Although population censuses for Italy are only available from the sixteenth century onward, fiscal documents on rural and urban inhabitants dating back to the late thirteenth century allow us to outline the demographic trend of the Italian population. Recently population figures for 1300 have been increased by about 10 percent,[5] while later figures have hardly been modified.[6] Research on specific regions more or less confirms the trend proposed in the past by K. J. Beloch in a study that is still the major basic reconstruction of the Italian population since the late Middle Ages.[7] Although the series of population for Italy as a whole are usually presented for 50 years intervals, it is possible to interpolate decadal figures (Figure 4.1).[8] A range of uncertainty of 10 percent around our figures on the fourteenth and fifteenth centuries would be considered plausible by most medievalists. The range diminishes from the sixteenth century.[9]

Several distinct periods (similar to the demographic trend of most European regions) can be identified:

- following a period of growth, which probably began in the tenth century, the medieval Italian population reached its peak in the decades after 1300, with about 12–13 million inhabitants;

- the Black Death in 1348–49 started the epoch of demographic decline. Several plague epidemics, after the first outbreak, intensified the fall in the following decades. The lowest level was attained in 1420–40, when the population was scarcely higher than seven million;
- a period of recovery followed. The level of population of the first half of the fourteenth century was reached again, and probably exceeded, at the beginning of the seventeenth century, when the Italian population was about 13.3 million inhabitants. In a region such as Tuscany, whose demographic history is better known, the pre-Black Death level (estimated at about 1.1 million) had not yet been reached in 1620–30 (when the inhabitants were 960,000).

During the Renaissance, the density of population in Italy was, in comparative terms, particularly high. In 1300, when there were in Europe (without Russia) nine inhabitants per km^2, the Italian average was 41.5. If we refer to the Center and North of Italy—the most inhabited part of the country—the density was 48.1, while in England and France it was around 30, and in Germany about 24.[10] Italian demographic density decreased to 25–30 in the fifteenth century and rose again to the 1300 level at the end of the sixteenth century.

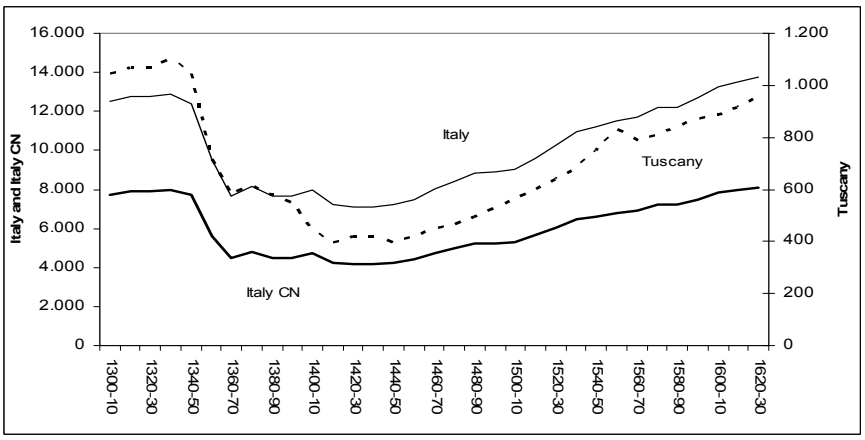

Figure 4.1 Italian population in the Center and the North and in Tuscany (1300–1630) (decadal data).

Note: The left vertical axis refers to the population of Italy and Central-Northern Italy (000); the axis to the right refers to the population of Tuscany (000).

Sources: Beloch, *Bevölkerungsgeschichte Italiens,* and *La popolazione d'Italia*, Bellettini, *La popolazione italiana*, Del Panta, Livi Bacci, Pinto, Sonnino *La popolazione italiana dal Medioevo a oggi*. For Tuscany: Marco Breschi, Paolo Malanima *Demografia ed economia in Toscana: il lungo periodo (secoli XIV–XIX)*, in M. Breschi, P. Malanima (eds.), *Prezzi, redditi, popolazioni in Italia: 600 anni (dal secolo XIV al secolo XX)* (Udine: Forum, 2002).

Population and Prices

Information on prices is available for several cities from the late Middle Ages onwards, although the best documented area is Tuscany. Both private (account books) and public documents allow the reconstruction of a yearly index from the late thirteenth century. Non-Tuscan data has been used for comparative purposes (Figure 4.2).[11]

It is well-known that, in pre-modern economies, a direct relationship between population and prices exists. Agricultural prices rose from the beginning of the thirteenth century, and, more rapidly, from about 1270, when the population was rising.[12] The upward trend continued for some decades after the Black Death. It is to be noted that Italian prices did not immediately diminish after the fall in population. The wider availability of money in most families and rising demand continued to fuel the upward trend in prices.[13] From about 1390 prices began to diminish, reaching their lowest level in 1420–60. A new rise started from 1470. Sixteenth century demographic growth was accompanied by the upward trend of prices. The end of the period in question is also the end of the so-called 'price revolution' in Italy. From 1600 onwards, the index declines.

AGRICULTURE

Natural Resources and Land Productivity

The dense Italian population inhabited a region of Europe relatively poor in natural resources, in comparative terms. Italy shares its physical

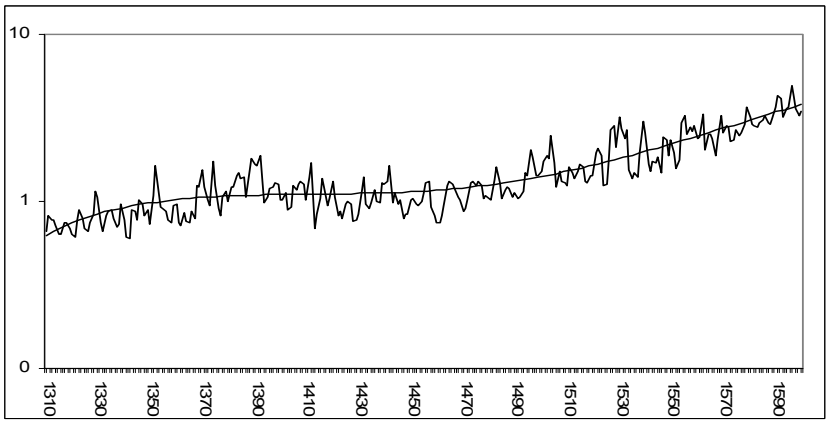

Figure 4.2 Price index 1310–1600 (1420–40=1) (log vertical axis).
Note: Polynomial trend (3rd degree equation).
Source: Appendix (col. 1).

characteristics with the other Mediterranean regions. Plains are scarce; cereal production per hectare is modest. The scarcity of arable land is partially compensated by the availability of soils suitable for the cultivation of trees and particularly vineyards. In Italy, 40 percent of the surface is made up of hills (between 300 and 6–700 meters above sea level); another 40 percent is covered with mountains (more than 700 meters above sea level). A mere 20 percent of the peninsula is flat, the only big plains being located in the Po Valley in the North and Apulia in the South. In the past, traditional arable agriculture covered, on the whole, about 45 percent of Italian territory, that is, all the plains and part of the hills.[14]

As is the case elsewhere in Europe, with the exception of England, data on yields are very scanty until the fourteenth century. For previous centuries we have data from the land inventories of religious institutions. For the late Middle Ages information collected by historians refers only to the North and the Center of the peninsula and is based on farms' accounting books.

On the scarce Italian arable land cereal yields are low, in comparison with Northern European regions, due particularly to soil aridity in spring and summer. We know that from the tenth to the fourteenth century, wheat yields rose in Italy from two quintals per hectare or less, to between 3.5 and five (Table 1).[15] The desertion of unproductive soils after the Black Death contributed to the rise in the level of yields from 1,350 to about 1,550.[16] The level then attained was only to be exceeded at the end of the nineteenth century. In the first half of the nineteenth century yields were in the range five to nine quintals per hectare in the North, four to eight in the Center, and three to seven in the South.[17] Land intensification was higher where the density of population was higher.[18] A comparison with England reveals a deep and increasing difference from the late Middle Ages onwards.[19]

Table 4.1 Wheat Yield in Central-Northern Italy from 1150 to 1650 (Quintals per Hectare)

	Italy CN
1150–1250	3.6
1250–1350	3.6-4.8
1350–1450	4.8-6.0
1450–1550	6.0
1550–1650	5.8

Note: The available data for Italy refer to yields per seed and not per hectare. In order to work out yields per hectare, I have assumed 120 kg per hectare as seed quantity.

Sources: Paolo Malanima, *La fine del primato. Crisi e riconversione nell'Italia del Seicento* (Milano: Bruno Mondadori, 1998): 42; Malanima, *L'economia italiana*.

Climate

Often natural resources in a region are considered invariable, but climatic changes can deeply influence resource availability, especially in the fragile Mediterranean landscapes.[20] I have already recalled that, in Italy, 40 percent of the territory is hilly. Now we know that a change of only one degree in the average temperature is likely to displace the altitude of wheat cultivation by about 100 meters above sea level.[21] Of the 31 million hectares that make up the whole of Italy, land between 600 and 700 meters covers more than two million hectares. A fall in the temperature of only one degree implies a drop in cultivation from 700 to 600 meters, and a decline in wheat production by an amount that could feed one to two million people.

Thanks to recent research, we now know the change in temperature in the region of the Alps during late medieval growth and the Renaissance (Figure 4.3).[22] It may be noted that the early medieval rise in population coincided with the so-called *Medieval Climatic Optimum*.[23] Temperature maxima during the Medieval Warm Period, between 800 and 1300, were on average about 1.7°C higher than the minima in the Little Ice Age and similar to present-day values. For a hilly country such as Italy the increase in natural resources, thanks to mild temperatures, contributed to supporting economic progress during the High Middle Ages, allowing the long-term cultivation of many more lands than before. Population rose accordingly and stabilized in the first decades of the fourteenth century, just when the so-called Little Ice Age was beginning.[24] Cultivation could no longer be carried out on parts of the hills. The decline in the average temperature from the late thirteenth century meant a sharp drop in food supply for thousands of people, while famines, unknown for several

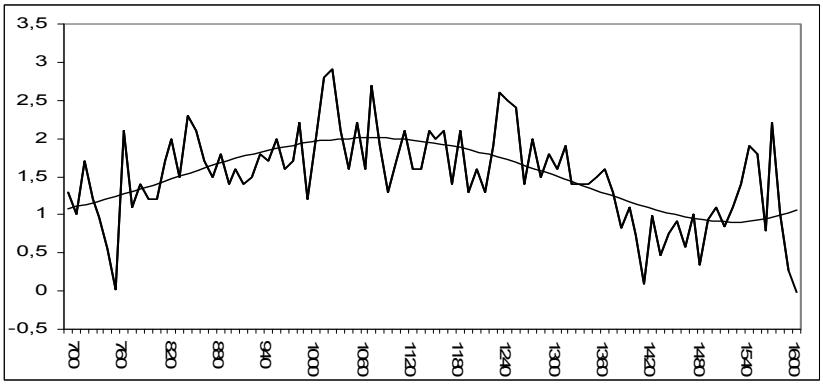

Figure 4.3 Temperatures in Northern Italy, 700–1600 (decadal data).

Note: Polynomial trend (4th degree equation). The average temperature is equal to one. The figures of the graph refer to deviations from the average.

Source: A. Mangini, C. Spötl, P. Verdes, *Reconstruction of Temperature in the Central Alps During the Past 2000 years*, in "Earth and Planetary Science Letters", (2005) 235, 3–4: 741–751.

centuries, began once more to hit the Italian population.[25] The sharp fall in the volume of agricultural output was not compensated by the rise occurring at the same time in per hectare yields, due, as we saw, to the abandonment of the least productive lands and the cultivation of the most productive soils. This change in temperature is likely to have influenced the course of the Italian economy (and others) much more than changes in institutions and techniques so often mentioned by historians.

Resources and Capital

The wealth of the Italian nation in 1861 has been calculated as 46–47 billion lire.[26] Estimates concerning the late nineteenth century and, obviously even more so, those relating to the late Middle Ages suggest nothing more than orders of magnitude and their long-term trend. Lands and dwellings in the countryside represented in 1861 almost half the total wealth: 22 billion lire. Since dwellings were evaluated at 1.6 billion lire, the agricultural wealth of Italy was made up of land transformed by centuries of labour and capital investment. Livestock, not included in the earlier calculation, was 1.5 billion lire.

R. W. Goldsmith proposed an estimate of the wealth of the Florentine Republic in 1427, based on the Catasto.[27] The total wealth of about 17.4 million florins, corresponding to six times the annual output, was composed primarily of real estate and residential structures (68 percent). Resources per head of population were then high because of the high mortality resulting from several plagues. The new upward trend of population from the mid-fifteenth century is likely to have provoked a decline in capital and resources per worker. In the Republic of Florence, wealth per capita in 1427 was 30–40 percent higher than in Italy in 1861.[28]

During the phase of medieval growth, which came to an end after 1300, capital formation in the cities flowed towards agriculture.[29] We know that, in the following centuries, as population pressure intensified, sizeable investments were made in land reclamation. Since capital formation is a function of the marginal efficiency of capital, and since marginal efficiency of capital depends on technological progress, for the Renaissance period[30] we cannot but expect a low level of investment in a *mature agrarian economy* such as that of Italy. As will be seen, the indirect evidence, based on wage trends, suggests diminishing marginal labor productivity from the late Middle Ages onwards. A plausible determinant of this decline is the fall in capital and resources per worker, while technological progress was unable to reverse the downward trend.

Labor and Institutions

During the medieval phase of growth, from the tenth to the fourteenth century, important changes occurred in the agricultural labor market and

especially in the institutions regulating the supply of labor. Seigneurial power weakened and the feudal dependence of peasant workers on landowners diminished and then vanished.[31] The manor as the institution that regulated peasant agricultural work disappeared during the eleventh and twelfth centuries.[32] Only in some northern mountainous areas, far from the urban agglomerations, and in the South, did seigneurs hold on, at least partly, to their feudal juridical power over rural populations. The causes often referred to, when dealing with the decline of this institution, are the progress of the market economy in the late Middle Ages, on the one hand, and the struggle by the urban communes against the feudal lords in the countryside, on the other. Several documents in which towns decreed the full personal freedom of the serfs are preserved.[33] This institutional change contributed to a more efficient allocation of labor and probably enhanced labor productivity in the countryside and cities, as a consequence of higher labor mobility.

The disappearance of the manorial economy was followed by the proliferation of small landownership. However, from the fourteenth century, which is when land censuses become available for some areas in the Center, small ownership was rapidly diminishing.[34] Rural families were forced to depend more and more on landowners and to work their lands on the basis of rent contracts. For the cultivation of their lands, use of wage labor by landowners was not widespread.

Sources, such as the agrarian contracts, allow for a satisfactory view of agrarian production relationships during the late Middle Ages. The topic has been the subject of abundant literature.[35] The disappearance of the manorial economy was followed by forms of land rent; either the rent was paid in kind (as in the case of the share tenancy, widespread from the fourteenth century, especially in Central Italy) or in money, as was common in the Po Valley. Wage labor was not widespread in the Italian Renaissance countryside. We have no direct information on its importance, although most medievalists would agree on a magnitude of 10–20 percent of the whole labor force being employed in agriculture (but not all the year round). The percentage was higher in Southern Italy than in the North. Advanced banking techniques in the cities co-existed in the North with a countryside where money was almost unknown by the peasant families. This is a feature peculiar to this region of Europe.

Wage rates, usually per day, provide detailed information on labor incomes and labor productivity. Indirect information—especially rent contracts—suggests that, where peasants were not employed as wage laborers, but as farmers whose income was made up of the share of total product after the payment of the rent,[36] the general trend was similar to that of the wage rates: that is, declining after the fifteenth century.[37] Competition among workers, despite labor market constraints, implied the convergence of diverse forms of labor income towards the level of money wages.

Innovations and Techniques

The period in question was not an innovative epoch. From the fifteenth century on, in the Center and North, the only meaningful change was the spread of the mulberry tree providing raw material for the developing silk industry.[38] By contrast, maize and rice only began to spread from the second half of the sixteenth century, at the end of the period we are dealing with, and their influence on land productivity was modest until a century later. Changes in the density of population were therefore followed by extensive growth and intensification in the exploitation of land. During the Renaissance, three-field rotation prevailed on the plains, while on the hills the two-field system and even the swidden, or shifting cultivation, were relatively widespread. In Roman antiquity, in the fertile plains of the Po Valley, convertible husbandry was already practised. It was again to be found during the late Middle Ages especially between Lodi, Milan, and Cremona, over an area where wet agriculture prevailed and where the urban elite and governments had invested in drainage and canal building.[39] Here, as regards the seed, a yield to seed ratio of 8:1 was sometimes reached, while the usual level on Italian arable land was around 4:1 to 6:1.[40]

As far as techniques for raising labor productivity in agriculture are concerned, no change took place during this period. The simple symmetric plow (with the exception of the Po Valley, where the asymmetric wheel-plow was already known in antiquity), the scarcity of draft animals and the widespread use of the spade and hoe continued to characterize this Mediterranean countryside. Italian agriculture between 1300 and 1600 could be defined as a *mature technological system*. During the Renaissance no significant change took place in the use of plows, working animals, or tools.[41] Only from 1800 on, and especially from the end of the nineteenth century, as recent research shows, new engines began to raise the level of labor productivity remarkably.[42]

Capital formation is spurred on by technological progress and then a growing marginal efficiency of capital. When technology and therefore agricultural and industrial growth are stagnating, any surpluses are more advantageously used in conspicuous consumption, such as building villas in the countryside, than in investment in agriculture or industry. Ample evidence on this kind of investment is still noticeable both in the cities and countryside.

Rural Wages

Documents on agricultural wages in the late Middle Ages are scanty. In Tuscany notarial documents and the account books of private and public institutions allow us to build a continuous yearly series of wage rates spanning the long period from 1320 to 1600.[43]

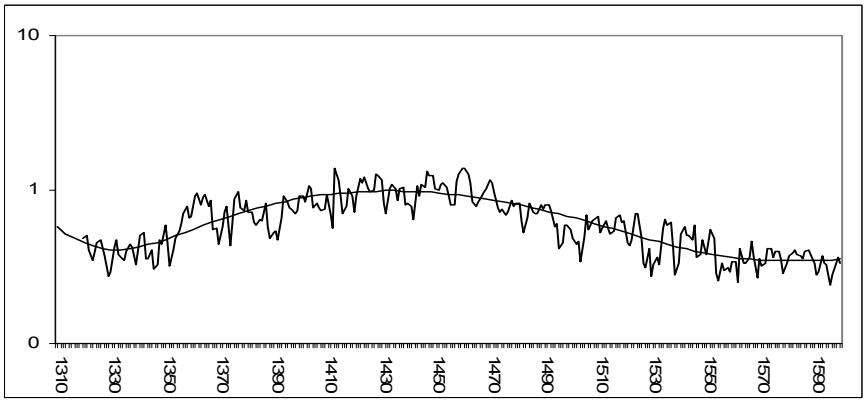

Figure 4.4 Index of real wage rates in agriculture, 1320–1600 (1420–40=1) (log vertical axis).

Note: Polynomial trend (5th degree equation).

Source: Appendix (col. 2).

Real agricultural wage rates show the following trend (Figure 4.4):[44]

- a decline prior to the Black Death;
- a strong increase from 1350 to 1460–70;
- a steep decline from 1460–70 to 1600.

It is, however, important to remember that a wage—per week, per month, or per year—is the result of the wage rate multiplied by the time actually worked. For the period we are dealing with, we know the level of wage rates, but not wages, since we do not know how many hours were worked in a year. It is plausible to suppose that, while wage rates increased and then decreased sharply in the period under examination, peasants worked shorter hours when wage rates were high and vice versa.[45] An intensification of labour—more workers and more hours per year—took place during the sixteenth century.[46]

The wages-population relationship is clearly inverse: decline in population as a consequence of the plague implied a rise in capital and resources per worker and subsequently in productivity and wage rates, whereas population growth from the mid-fifteenth century onwards implied decline in productivity and subsequently in wage rates.

Agricultural Product

Yearly series of population, prices, wages, and temperatures, together with information on technology already make it possible to draw some provisional conclusions on the trend of the rural economy. We saw that in the last phase of medieval growth the pressure of population was increasing. As far as

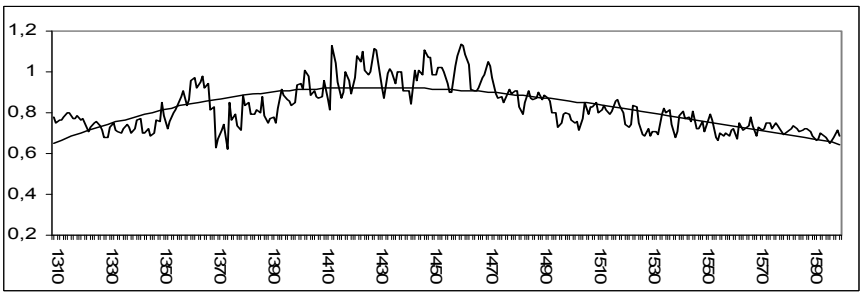

Figure 4.5 Per capita agricultural product, 1310–1600 (1420–40=1).
Note: Polynomial trend (3rd degree equation).
Source: Appendix (col. 5).

agriculture is concerned the unfavorable climatic conditions on the one hand and the technical stagnation on the other, together with the drop in resources and capital per worker were contributing to a decline in rural labor productivity. As a consequence, labor incomes were already diminishing in the decades before the Black Death.[47] However, the arrival of the plague and the subsequent high mortality were able to invert the trend for about a century.

Since direct information on the agricultural product for the epoch in question is scarce and refers, in any case, to small farms and short periods, we can draw a general outline of the trend of agricultural product by combining the information from the series on prices and wages.[48]

The graph (Figure 4.5) can be considered as the synthetic result of multiple events taking place both in prices (agricultural and non-agricultural) and labor incomes. Per capita agricultural output immediately rose following the Black Death; then, after declining for a decade, it rose continuously until 1420–60, to diminish thereafter until the end of the sixteenth century. The hypothesis of agricultural prosperity for about a century after the Black Death seems better supported by the evidence than is the view of decline. However, agricultural output represents only a part, although a large part, of the total product. Our attention must now be turned to the non-agricultural side of the economy.

THE NON-AGRICULTURAL SECTORS

Cities

Data on urban inhabitants have been collected by scholars from different sources such as fiscal documents, chronicles, the number of men able to bear arms, professional groups (such as notaries), and population censuses (in this case only from the sixteenth century).[49] The degree of reliability improves during the period here in question.[50]

Since the late Middle Ages, Central and Northern Italy have been characterized by several big cities, without a dominating capital city (such as Paris, London, Constantinople or, in early modern Southern Italy, Naples). The nature of Italian urbanisation, at least from the late Middle Ages until today, could be defined as polycentric (see Map).

In the centuries we are dealing with, between 59 and 96 centers were inhabited by more than 5,000 inhabitants and 21 to 53 by more than 10,000. This polycentric character is clearly revealed by the rank-size distribution (the distribution of towns according to their size), which was quite stable between 1300 and 1600 (Table 2). The number of cities dropped in the fifteenth century. The decline in total population also resulted in a fall in urbanization.[51]

Figure 4.6 Main Italian cities in 1300 (with more than 15,000 inhabitants).

Table 4.2 Number of Italian Cities (with More Than 5,000, 10,000, and 20,000 Inhabitants) and Coefficients of the Rank-Size Distribution, 1300–1600

	Number>5,000	*Number>10,000*	*Number>20,000*	*Coefficientsr-s-d*
1300	193	79	26	0.72
1400	94	26	15	0.72
1500	146	51	18	0.75
1600	208	75	25	0.75

Note: The coefficients of the rank-size distribution are computed through the following regression: $\log S_r = S_1 - u \log r$: where S_r is the size (the population) of a particular city; S_1 the size of the first (main) city; and r the rank (represented by the series of natural numbers from 1, the main city, to n, the smallest city). The coefficient u is represented in column 5. While a result higher than 1 is correlated with the presence of one or more large dominating cities, a less steep slope, as in the case of Italy, suggests a more polycentric distribution.

Source: Malanima, "Urbanisation and the Italian Economy".

Apart from the three main centers with more than 100,000 inhabitants in 1300, Florence, Milan, and Venice, several significant towns were located in the northern half of the peninsula and above all in the Po Valley and in the Center. Naples was already a large city, with more than 30,000 inhabitants, but was not yet in the leading group. Big cities in the South were fewer than the North.

All these towns grew during the medieval expansion, from the tenth to the fourteenth century, thanks to the immigration of people from the countryside, supported by the remarkable progress of industrial activities and services (political, administrative, religious, military, and economic), and the struggle against feudal powers of the communes, whose interest was to allow the mobility of rural inhabitants towards the developing urban industries.[52]

The Urban Sectors

Today economic growth theories have repeatedly emphasized the role of human interchange in the rise of useful knowledge.[53] This interchange or intercommunication is likely to take place primarily, and almost exclusively, in the cities. Between 1300 and 1600, Italian centers of more than 5,000 inhabitants comprised a population between 2.5 and three million (in 1300 and 1600) and 1.1 million (in 1400). The impact of human interaction is likely to have been much stronger within this European region than elsewhere in the continent. Nowhere was the rate of urbanization over a relatively wide area as high as in the Italian peninsula. Only in Flanders, in an area 10 times smaller than Italy, was the rate of urbanization higher. The effects of urban culture on technological progress and innovation have

often been emphasized. The Renaissance was, after all, the outcome of urban culture in the most urbanized areas of Europe.[54]

Especially after 1350, the expansionist policy of the major, and financially strong, Italian cities pushed toward the formation of regional states whose main examples are the Republics of Florence, Venice, and Genoa and the State of Milan. Several minor states continued to exist in the interstices of the main regional city-states.[55] The fragmentation of the political scene in the North was the result of the competition and struggle among many strong rival cities.

In the South the situation was different; it was more similar to that taking place north of the Alps, with the formation of a relatively large kingdom with a sizeable capital, Naples, seat of the crown, court, and aristocracy. No other city or center of power was able to shatter in the South the Neapolitan supremacy, with the exception of the Papal State, another important seat of power able to counterbalance other peninsular powers both in the South and the North.

On the basis of indirect information, we know that in the thirteenth century immigration into the cities rose thanks to increasing textile (wool, cotton, and silk) and banking activities, which formed the basis of the economy and were the dominating sectors. Ample literature is available on these urban sectors. For a long time, until the 1970s, urban industries and trade were the central interest of the medieval economic historian.[56]

While there were no meaningful technological innovations in agriculture in the period we are dealing with, by contrast, we know that technological changes and new industrial sectors (such as printing) were spreading within urban economies. Indirect evidence of technological dualism in agriculture and industry is provided by the relative trends of agricultural and industrial prices (Figure 4.7).[57]

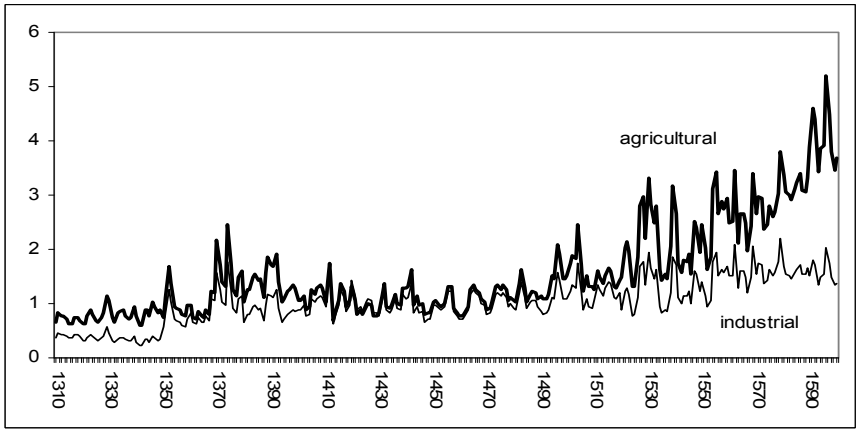

Figure 4.7 Agricultural and industrial price indices, 1310–1600 (1420–40=1).
Source: Malanima, *L'economia italiana*: 405.

We see that, during the sixteenth century, while agricultural prices were rising under the pressure of the population, industrial prices grew much less. A noteworthy example is represented by the prices of silk textiles, where innovative techniques and forms of organization were progressing fast and making labor more efficient.[58]

Labor and Wages

Wages can suggest the trend of labor productivity within the cities. While in agriculture wages were not the ordinary form of income from labor, in the cities the majority of the population depended on wages for subsistence. Wage rates, therefore, provide an important clue to the conditions and standards of living of a considerable percentage of the population. Series of wages in the building industry, usually based on the account books of rich families and institutions, have been elaborated. Once again more data are available for Tuscany than other Italian areas, but we have series of wages for Venice from 1380, Genoa from 1500, and Naples from 1530.[59]

Masons' wage rates suggest a trend shared by many other urban workers (Figure 4.8).[60]

The same three phases already stressed in the case of agricultural laborers are to be found in the movement of masons' wage rates, although with some differences in intensity:

- the decline prior to the Black Death is clear both for urban and rural workers;

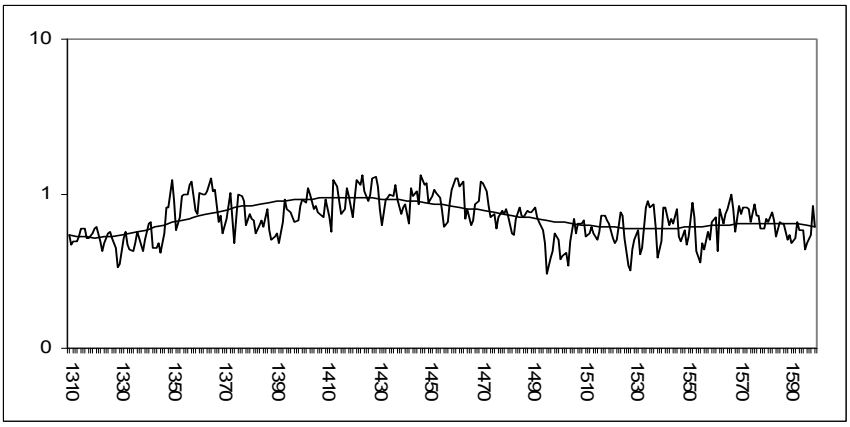

Figure 4.8 Index of real masons' wage rates, 1310–1600 (1420–40=1) (log vertical axis).

Note: Polynomial trend (5th degree equation).
Source: Appendix (col. 3).

- the increase from 1350 to 1460–70 is more modest for urban than rural workers;[61]
- the decline from 1460–70 to 1600 is not so steep and, in any case, not so continuous.

Urbanzsation

In 1300 Italian urbanization, particularly in the Center and North, was considerably higher than elsewhere in Europe. In the South, together with the islands (Sicily and Sardinia), the level was lower in 1300 and 1400, although still high from a European perspective. It is uncertain if in this epoch some backwardness of the Southern economy relative to the North already characterized the Italian economy. Although the existence of two Italies has been suggested,[62] nothing certain can be said about a North-South disparity in the late Middle Ages (Table 4.3).

The trend of urbanization suggests a decline during the fifteenth century, a recovery in between 1450 and 1550, and another decline thereafter, at least in the Center and North. Urbanization apparently grew in the South and the islands, although it was a consequence of the rising number of large centers inhabited by peasant families, which could be defined as 'agro-towns,' rather than true cities. [63]

A plausible explanation for the decline in the rate of urbanization in the fifteenth century is that, in Euro-Mediterranean cities, depopulated after the Black Death, the customers of luxury Italian industries and services were fewer and more dispersed, pushing up the cost of transportation: the accessible clientele had diminished.

Although in the cities a generally small percentage of the population worked in the primary sector, and in the villages there were always some craftsmen, the rate of urbanization (when centers with more than 5,000 inhabitants are included) provides good information on the relative ratio of non-agricultural employment. Urbanization rates are, however, lower than the percentage of population working outside agriculture. Data on

Table 4.3 Urbanization Rates in Central and Northern Italy (CN), in the South with the Islands (SI), and in the Whole of Italy (Centers with 5,000 inhabitants and More), 1300–1600 (%)

	CN	*SI*	*Italy*
1300	21.4	18.6	20.3
1400	17.6	8.5	13.9
1500	21.0	21.5	21.2
1600	18.4	28.6	22.6

Source: Malanima, *Urbanisation and the Italian Economy.*

urbanization suggest that 15–25 percent of the population were employed in secondary and tertiary jobs. It may be supposed that another 5–10 percent of non-agricultural workers lived in the countryside.

Capital Formation in the Towns

It is a widespread opinion that Italian cities were rich and that in these cities inequality was notable; a fact confirmed by scholarly research on Renaissance Tuscany.[64] We also know that financial institutions existed and were able to channel savings into capital. During the High Middle Ages, the phase of progress up to about 1300, the savings of landowners and especially merchants were invested both in the countryside and towns. From the middle of the fourteenth century to about 1450 the fall in population implied a rise in fixed capital and natural resources per worker, as the high level of labor productivity and wage rates confirm.[65] Probably the need for investment was low, as the decline in the rate of interest also suggests.[66] The wealth of rich urban families was channeled towards buildings, a form of relatively unproductive capital, and art.

The prevailing low rate of interest during the sixteenth century testifies to the fact that, in the mature Italian economy, given technological stability in the primary sector, the low marginal productivity of capital did not attract savings. To the question often asked by historians, whether capital formation was low because the rich Italian families used their incomes on palaces, churches, and art we could answer that, since the productivity of investment was low, rich families spent their incomes in a more socially attractive way.[67] Buildings and art are rather the consequence of the low capital formation than the cause.

Non-agricultural Product

As mentioned earlier, secondary and tertiary sectors were not wholly concentrated in the towns, although the majority were urban. In the period with which we are dealing, no remarkable changes took place in this town-country distribution. As far as we know, the fifteenth century was not an age of proto-industrialization.

For industry and trade, as with agrarian production, direct information on the output of commodities and services refers only to specific firms and banks or companies. On the whole, it is insufficient for trying to define the general movement of non-agricultural product. However, we can trace a trend on the basis of information concerning urbanization. In Central and Northern Italy the level of urbanization after the Unification (1861) and in the following decades was more or less in the same range as in the late Medieval and early Modern Ages. On that basis we can compute the share of the non-agricultural per capita product in previous centuries (Table 4.4).[68]

Table 4.4 The Percentage of the Non-agricultural Sectors in the Gross Product, 1300–1650, in the Center and North of Italy

	%
1300	49.3
1350	42.6
1400	42.4
1450	41.3
1500	48.6
1550	46.7
1600	43.8
1650	38.0

Source: Malanima, "Measuring" and Malanima, "The Long Decline of a Leading Economy: GDP in Central and Northern Italy 1300–1913."

First, it may be seen that the proportion of non-agricultural output in the total GDP is higher in this pre-modern Italian economy than often assumed by scholars dealing with pre-modern agrarian economies. In part, this result depends on the relatively advanced character of the Italian Renaissance economy. It also depends, however, on the underestimation by historians, when dealing with the pre-modern economies, of the non-agricultural product and especially of services. Probably not only in Italy, but elsewhere in Europe, industry and services together represented about 40–50 percent of the gross product in the period in question.[69]

In Italy, the non-agricultural share of product was over 10 percentage points higher in 1300 than in 1650. In the fifteenth century the curve drawn by Italian industries and services diminished sharply, to return to the level of 1300 in the first half of the sixteenth century, and then to fall again, reaching its lowest level since the Middle Ages in 1650. This result concurs with the trend often suggested by past historians on the basis of the fragmentary evidence provided by the production of specific sectors and companies. The increase in the agricultural product contributed to counterbalancing the decline of non-agricultural output during the fifteenth century.

THE PRODUCT OF THE RENAISSANCE ECONOMY

An Index of Wage Rates

We are now able to compose an aggregate view of incomes and product.

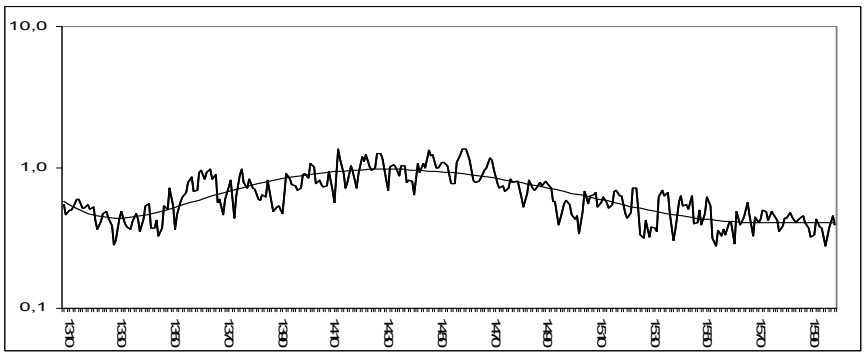

Figure 4.9 Index of wage rates, 1310–1600 (1420–40=1)(log vertical axis).
Note: Polynomial trend (5th degree equation).
Source: Appendix (col. 6).

The index of labor incomes is based on earlier indices of rural and urban wage rates, weighted by the relative importance of the rural and urban labor forces,[70] proxied by urbanization rates (Figure 4.9).[71]

Since a higher percentage of the labor force was in the countryside than in the towns, the result corresponds more closely to agricultural than to urban wages. The trend confirms the decline between 1300–50, the increase culminating in 1420–60, and the subsequent fall.

An Index of Per Capita Product

On the basis of agricultural output, and the percentage of non-agricultural, it is now possible to present a view of the Italian product, both per capita and aggregate (Figure 4.10).[72]

We can distinguish three phases in the trend over three centuries:

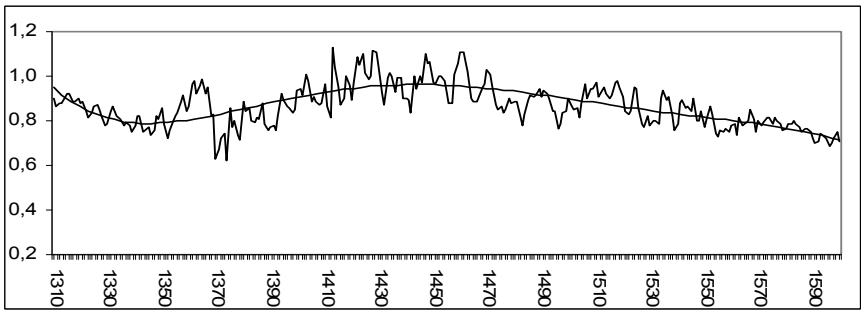

Figure 4.10 Index of per capita product, 1310–600 (1420–40=1).
Note: Polynomial trend (5th degree equation).
Source: Appendix (col. 6).

1. the decline from a high level during the first half of the 14th century, lasting until 1370;[73]
2. the rise from 1370 to 1470;
3. the fall from 1470 to the end of our series (with some decades of recovery between the 1490s and 1520s).

The relatively high level around 1300 was the result of the urban economy (50 percent of the product); the fifteenth century peak was based, by contrast, on agriculture (urban output per capita was, in fact, diminishing); again, for some decades between 1480–1550, secondary and tertiary sectors partially compensated the agricultural decline. A clearly downward trend was only visible from the second half of the sixteenth century. On the whole, agricultural and non-agricultural sectors counterbalanced themselves and maintained a high level of output and income from 1300 to the middle of the sixteenth century.

International comparisons are difficult for the period we are dealing with. We can only say that in the decades 1420–60 the highest level in Italy is close to that attained by the Netherlands in 1650–1700 and by the United Kingdom in 1820.[74] Between the late Middle Ages and the start of modern growth these three leading economies shared quite similar levels of average product.[75]

Since we have two reliable estimates on per capita product for the Florentine Republic in 1427–40, we can check the previous series through a comparison between the first half of the fifteenth century and the period after the Unification.[76] We discover that both direct data (deflated by means of our price index) and the index of per capita product, suggest a decline of about 25–30 percent between about 1420–40 and 1860–70.[77] From the Renaissance period onwards, the Italian economic trend was more or less downward until the start of relatively recent modern growth, which began in Italy around 1880.

An Index of Gross Product

Since changes in per capita product fluctuated within a narrow range, the trend of the aggregate product between 1300–1600 closely follows that of population (Figure 4.11).[78]

While there was no crisis in per capita product during the Renaissance, gross product diminished sharply just when average incomes were at their highest level.

GROWTH AND DECLINE

The Intensive Production Function

To explain the trend, we can start from a production function, including resources together with capital and labor:

$$Y = TF(L,K,R)$$

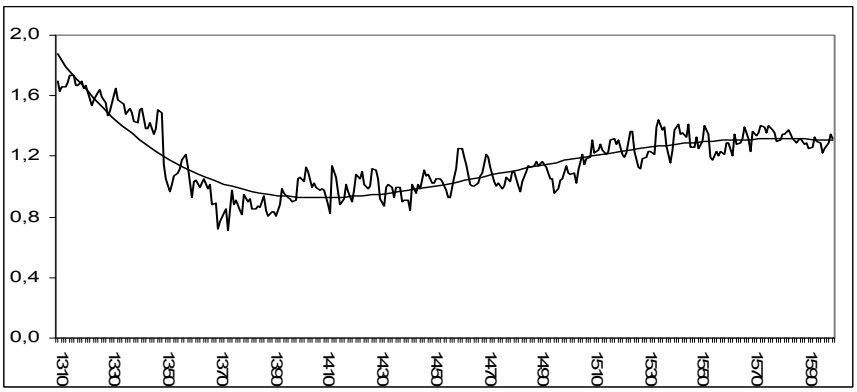

Figure 4.11 Index of gross product in Central and Northern Italy, 1310–1600 (1420–40=1).

Note: Polynomial trend (4th degree equation).
Source: Appendix (col. 7).

where Y is product, T the level of technology together with human useful knowledge, and L, K, and R are the production factors: respectively labor, capital, and natural resources.

A clearer view is given by the so-called intensive form of the production function; here obtained by dividing both the dependent and independent variables by labor (L):

$$\frac{Y}{L} = TF\left(\frac{K}{L}, \frac{R}{L}\right)$$

The dependent variable is now the average labor productivity (Y/L). A direct relationship exists between Y/L, on the one hand, and capital (K/L) and natural resources per worker (R/L), both multiplied by the level of technique (T), on the other.

The Trend: 1300–48

Technological change was unable, in the long run, to counterbalance the declining ratios K/L and R/L and make capital or resources more productive. The ratio R/L diminished as a consequence both of rising population and worsening climatic conditions from the end of the thirteenth century. Capital per worker did not compensate this fall, as the drop in wage rates show. Productivity (Y/L) was declining in the first half of the fourteenth century when population was about 12–13 million. The reasons for this trend lie in the interplay of R, K, and L in the background of a relatively stable level of technology. The high medieval growth was reaching its phase of *maturity*. The favorable epoch of slow progress, supported by good

climatic conditions (and subsequently more natural resources), investment in agriculture, and institutional changes was coming to an end. From this viewpoint, Lopez and Miskimin were correct in their analysis.

The Trend: 1348–1470

The arrival of the Black Death in 1348 changed the picture radically. Epidemics are exogenous in relation to the production function. Worsening economic conditions in the previous decades cannot be considered as a determinant of plague. Plague is, after all, a random variable. Its spread, however, was favored by the high density of population (which fostered a higher probability of infection and transmission of disease and a more unhygienic environment, with more rats and fleas). Necessity and chance are connected in the spread of epidemics. Population growth does not cause infection directly, but indirectly fosters the probability of infection. The relationship between economy and epidemics is not deterministic.

Plague caused a sudden change in the production function. It destroyed men, but not resources and capital. The drastic fall in available labor implied a change in the ratios K/L and R/L. Capital and resources per worker rose rapidly because of the fall in the denominator. Both labor productivity and wage rates improved. A favorable epoch began for the survivors of the Black Death and the frequent plagues that followed. The high living standards during the Italian Renaissance, similar to those of the Dutch Golden Age some 200 years later, were supported by the high mortality. It was possible then to work less,[79] to enjoy improved living conditions,[80] to invest surpluses in building palaces and churches, and in art. In a sense, all this was based on the change in relative prices of production factors prompted by the shock of death. Growth in per capita terms was not the result of the increase of the numerator of our ratios (K and R), or the progress of technology (T), as during modern growth, but of the diminution in the denominator. If by growth we mean increasing per capita income, then from about 1350–1550 there was growth in Italy, although a strange kind of growth, supported as it was, not by technical progress or rising capital formation, but by the high mortality during the era of plague.

The Trend: 1470–1600

Improved living standards and, particularly, fewer epidemics[81] favored family formation and a rise in population in the second half of the fifteenth century. With the background of a stable technological level and diminishing natural resources per worker (prompted also by the low temperatures during the Little Ice Age), from 1550–60 onwards labor productivity began to decline again and, with it, per capita product and living conditions. The happy epoch of the Italian Renaissance was reaching its end. While death supported the Renaissance economy, life was, by contrast, the main determinant of its end. After all, R. Romano was right in his representation of

the Renaissance economy as a prosperous age between two crises: the crisis of the first half of the 14th century and the crisis of the 17th century.[82]

A Geometric Representation: Growth

A geometric representation can help clarify the main lines of the trend. The following Figure 4.12 is nothing more than the intensive form of the production function, where, on the vertical axis, we find labor productivity (Y/L) and, on the horizontal, the reciprocal of the ratio of resources plus capital as to labor $L/(K+R)$.[83]

The horizontal line S represents the level of individual subsistence. As soon as the ratio $L/(K+R)$ increases, labor productivity diminishes as a consequence of decreasing returns to labor. The increase can depend on the rise in L, but also on the diminution of $K+R$. In both cases a displacement to the right occurs. While the classical economists looked especially at L, the numerator of our ratio and, in their view, decreasing returns always depended on its rise, foregoing analysis witnesses the importance of non-economic and non-deterministic factors, such as climatic changes and epidemic shocks. Chance plays a major role.

Fifteenth century economic conditions correspond to the point of Y/L in B. Here are the main economic features:

- gross product (the area $ABCD$) is far higher than the subsistence (the area SS_1CD);
- the surplus of the economy ABS_1S, the share of product that exceeds mere economic reproduction, is wide;
- this surplus beyond mere reproduction can allow both consumption over and above subsistence level and investment in building and art.

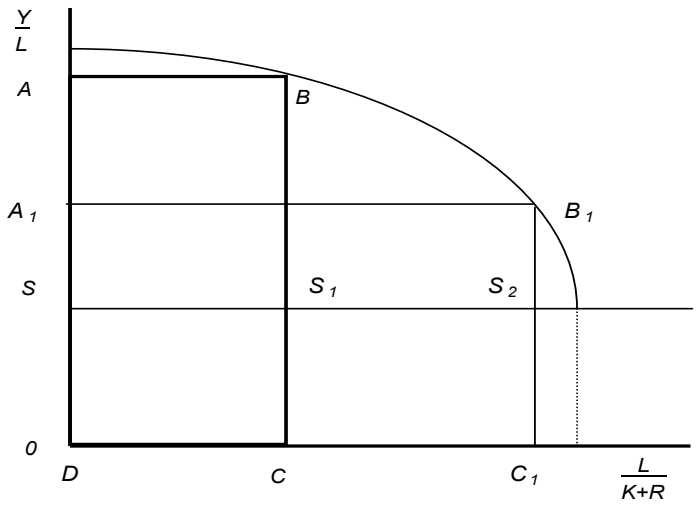

Figure 4.12 The intensive production function.

A Geometric Representation: Decline

From the 1470s to the end of the sixteenth century, labor productivity declined as *L* rose, while resources (because of the drop in temperature) and capital were diminishing, at least in relative terms. The *L/(K+R)* ratio increased and labor productivity moved towards B_1. In that case, the area of gross product was higher than before, primarily because population was 60 percent more than it was in *B*:

$$A_1B_1C_1 > ABCD$$

The volume of surplus was, however, relatively lower:

$$\frac{A_1B_1C_1D}{SS_2C_1D} < \frac{ABCD}{SS_2C_1D}$$

Here the main differences from the earlier century are summarized:

- in 1550–1600 the surplus as a ratio to subsistence was lower than it was around 1450;
- wage rates were lower, since productivity was lower, and they approached bare subsistence;
- people were forced to work longer hours and more members of the family had to work harder and harder to displace the curve of average product to the right and hence increase their income;
- the volume of investment in building and art was relatively lower, although, in absolute terms, it might have been higher than before.

From the end of the sixteenth century, the long Italian Renaissance was ending.

CONCLUSION

Following Cipolla, if we take per capita product as the main economic indicator, the period we are dealing with was an epoch of wealth and relatively high standard of living. It was the period of the *maturity* of the Italian economy.[84] While urban sectors were prosperous and progressing, the relative technological stability of the agrarian base prevented further advancement. Already in the first phase of our history, before the Black Death, the economy was declining. The arrival of the plague, an external shock, postponed this decline. An epoch of prosperity—albeit based on death—was beginning. The formation of a surplus beyond the immediate need for survival and the scanty opportunities for productive investment allowed this surplus to be channeled towards building churches and palaces. The

Renaissance was supported by flourishing economic conditions. From the second half of the fifteenth century onwards, the revival of demographic expansion in the presence of low capital formation, of unfavorable climatic conditions and diminishing availability of natural resources, started the decline, despite the counterbalancing effect of some prosperous decades for industrial, commercial, and banking activities. The technological constraints that prevented agricultural production from supporting the growth in population resulted, in the end, in rapidly rising agricultural prices, relatively diminishing industrial prices and declining profits.[85] Productivity fell and, as it did so, the Renaissance economy reached its end. The technological constraints of mature, traditional agriculture were, after all, the main obstacle to further expansion.

As in Roman times and subsequently, for some 1,500 years, Italy had been the center of the Western Euro-Mediterranean civilization and also one of the world's most advanced areas, if not the most advanced; from the late Renaissance onwards it slipped from center stage into the background, where it remained for a long time.

NOTES

* The Appendix of the chapter together with the presentation of the statistical procedures and series concerning late medieval to early modern Italian economy (population, prices, urbanisation, etc.) are available at www.paolomalanima.it. Any series used in the present paper is analyzed on the website. See also the Appendix in Paolo Malanima, *L'economia italiana. Dalla crescita medievale alla crescita contemporanea*, Bologna, Il Mulino, 2002 on data and documents concerning the Italian economy from the late Middle Ages until the end of the nineteenth century. The whole series of GDP in Italy from 1300 until 1913, together with the presentation of the statistical methods, is published in Paolo Malanima, "The Long Decline of a Leading Economy. GDP in Central and Northern Italy 1300–1913", forthcoming in *European Review of Economic History*.

1. Roberto S. Lopez, Harry A. Miskimin, "The Economic Depression of the Renaissance," *Economic History Review*, II s., XIV (1962): 408–426.
2. Carlo Maria Cipolla, "Economic Depression of the Renaissance?" *Economic History Review*, II s., XVI (1964): 519–27.
3. The term was already used by Cipolla, "Economic Depression of the Renaissance?".
4. Armando Sapori, *Il Rinascimento economico*, in *Studi di storia economica (secoli XIII-XIV-XV)*, Firenze, Sansoni, 1982 (1st ed. 1952): I, 618–652. See also Richard A. Goldthwaite, *The Economy of Renaissance Florence*, Johns Hopkins University Press, Baltimore, 2009, where the Renaissance economy covers the long period from the eleventh century until the end of the sixteenth.
5. See the chapter by Pinto in Lorenzo Del Panta, Massimo Livi Bacci, Giuliano Pinto, Eugenio Sonnino, *La popolazione italiana dal Medioevo a oggi* (Bari-Roma: Laterza, 1996).
6. See the comments by Guido Alfani, "Population et environnement en Italie du Nord au XVIe siècle, " *Population*, 62, (2007): 667–705.

7. Karl Julius Beloch, *Bevölkerungsgeschichte Italiens* (Berlin-Leipzig: De Gruyter, 1937–1961).
8. Data on population are presented and discussed in Malanima, *L'economia italiana*. App. I, and, from antiquity until 1900, in Elio Lo Cascio, and Paolo Malanima, "Cycles and Stability. Italian Population Before the Demographic Transition (225 B.C.–A.D. 1900)," *Rivista di Storia Economica*, n.s. (2005), XXI, 3: 5–40.
9. See, however, the comments by Giovanni Levi, "L'energia disponibile," in *Storia dell'economia italiana,* R. Romano (ed.) (Torino: Einaudi, II, 1991), 141–168 on Carlo Maria Cipolla, "Four Centuries of Italian Demographic Development," in *Population in History. Essays in Historical Demography*, D. V. Glass, D. E. C. Eversley (eds.) (London: Edward Arnold, 1965: 570–587.
10. These data and their sources are presented in Paolo Malanima, *Pre-modern European Economy. One Thousand Years (10th–19th Centuries)* (Leiden-Boston: Brill, 2009) and Paolo Malanima, "The Long Decline of a Leading Economy", (forthcoming) and Malanima, *L'economia italiana*, App. I.
11. For Tuscany we can use yearly prices for almost all the items in the basket from 1310 on; we have only wheat prices for the second half of the thirteenth century. I discussed the problem of sources for prices in Malanima, *L'economia italiana*, App. 3. The basket used to build the price index is presented and discussed in Malanima, *L'economia italiana*, Paolo Malanima, "Wages, Productivity and Working Time in Italy 1300–1913," *Journal of European Economic History,* 36 (2007): 127–174. A series concerning Naples from 1474 onwards, in Giuseppe Coniglio, "La Rivoluzione dei prezzi nella città di Napoli nei secoli XVI e XVII," in *Atti della IX riunione scientifica della Società Italiana di statistica (Roma, 7–8 gennaio 1950)* (Spoleto, 1952) has also been used for comparisons between North and South. A yearly consumer price index has been built by Robert Allen, "The Great Divergence in European Wages and Prices from the Middle Ages to the First World War," *Explorations in Economic History*, 38, (2001): 411–447. Similarities and differences between these two indices are presented at www.paolomalanima.it.
12. David Herlihy, *Medieval and Renaissance Pistoia: the Social History of an Italian Town, 1200–1430* (New Haven: Yale University Press, 1967).
13. I follow the explanation given by John Munro, *Before and after the Black Death: Money, Prices, and Wages in Fourteenth-Century England*, Department of Economics, University of Toronto, Working Paper n. 24 (2004), on the rising trend in prices for some decades after the Black Death.
14. Svimez, *Un secolo di statistiche italiane. Nord e Sud 1861–1961.* (Roma, Svimez, 1961) Chap. 1. This data refers, however, to the nineteenth century.
15. Massimo Montanari, *La società medievale di fronte alla carestia*, in Id., *Campagne medievali* (Torino: Einaudi, 1984): 191–200.
16. Often yields are higher when population pressure forces farmers to intensify the use of land. During the fifteenth century, however, the abandoning of the less fertile lands implied a rise in yields.
17. Giorgio Porisini, *Produttività e agricoltura: i rendimenti del frumento in Italia dal 1815 al 1922,* in "Archivio dell'Unificazione Italiana", XX, 1971*:* 24.
18. The meaning of "land intensification" is the same as in Ester Boserup, *The Conditions of Agricultural Growth* (London: Earthscan, 1965).
19. Although the figures proposed for England by Gregory Clark, "Yields per Acre in English Agriculture, 1250–1860: Evidence from Labour Inputs," *Economic History Review*, II s., XLIV (1991): 445–460 and Bruce M. S.

Campbell, *English Seigniorial Agriculture 1250–1450*. (Cambridge: Cambridge University Press, 2000): 306 ff. for the late Middle Ages are different, they are, however, higher than those relating to Italy in the same period.

20. See the classical reconstruction of Mediterranean geography put forward by Fernand Braudel, *La Méditerranée et le monde méditerranéen à l'epoque de Philippe II* (Paris: Colin, 1966) (2nd ed.).
21. Patrick R. Galloway, "Long-Term Fluctuations in Climate and Population in the Preindustrial Era," *Population and Development Review*, 12, (1986): 1–24.
22. Research done by paleo-climatologists in recent years on temperatures in the Northern Hemisphere confirms the series presented in Figure 4.3 relating to the Alps. See, as examples, Michael E. Mann, Raymond S. Bradley, M. K. Hughes, "Northern Hemisphere Temperatures During the Past Millennium: Inferences, Uncertainties, and Limitations," *Geophysical Research Letters*, 26, (1999): 759–762.
23. See Mann's recent work Michael E. Mann, "Medieval Climatic Optimum," in *The Earth System: Physical and Chemical Dimensions of Global Environmental Change*, 1, in, *Encyclopedia of Global Environmental Change*, T. Munn (ed.), (Chichester: Wiley, 2002): 514–516: a brief survey devoted specifically to the period in question.
24. Giuliano Pinto, *Firenze e la carestia del 1346–47*, in Id., *La Toscana nel tardo Medioevo. Ambiente, economia rurale, società* (Firenze: Sansoni, 1982): 333–379 (1st ed. 1972).
25. See especially Massimo Montanari, *L'alimentazione contadina nell'alto Medioevo* (Napoli: Liguori, 1979), and Massimo Montanari, *La società medievale di fronte alla carestia*, in Id., *Campagne medievali* (Torino: Einaudi, 1984): 191–200.
26. See the important work by Raymond W. Goldsmith, and Salvatore Zecchini, "The National Balance Sheet of Italy (1861–1973)." *Rivista di Storia Economica*, n.s., XV (1999): 3–20.
27. See Raymond W. Goldsmith, *Pre-modern Financial Systems. A Historical Comparative Study* (Cambridge: Cambridge Univ. Press, 1987): 145 ff. The ratio of wealth to per capita GDP is confirmed by the following estimate of product, in section 4. The Florentine Catasto is the well-known land and wealth census relating to the Florentine Republic.
28. The comparison is based, for 1427 Tuscany, on Goldsmith, *Pre-modern Financial Systems* and, for 1861 Italy, on Goldsmith, Zecchini, "The National Balance Sheet of Italy (1861–1973)."
29. A wide variety of literature exists on the topic starting with Carlo Cattaneo, *Saggi di economia rurale*, ed. L. Einaudi (Torino: Einaudi, 1975), who wrote at the middle of the nineteenth century.
30. As will be seen in section 2.5. Ruggiero Romano, *Tra due crisi: l'Italia del Rinascimento* (Torino: Einaudi, 1971), and Ruggiero Romano, *Paese Italia. Venti secoli di identità* (Roma: Donzelli, 1997), while mentioning the investments in agriculture, always stressed the backward character of Italian agriculture in his numerous essays.
31. A fine reconstruction of all these changes is proposed by Antonio I. Pini, *Città, comuni e corporazioni nel medioevo italiano* (Bologna: Clueb, 1986). Feudalism represented in Italy as elsewhere a dynamic phase in the building of European civilization. This dynamic phase was reconstructed by Cinzio Violante, *La società milanese nell'età precomunale* (Roma-Bari: Laterza, 1981) (1st ed. 1953), in his great book on Milanese society in the early Middle Ages. A negative view of feudalism in Italian history is presented in several chapters of the *Storia d'Italia*, ed. by R. Romano, C. Vivanti (Torino: Einaudi, 1972 ff.). See also Romano, *Paese Italia*.

32. Paolo Cammarosano, *Le campagne nell'età comunale (metà sec. XI-metà sec. XIV)* (Torino: Loescher, 1974): 94 ff., where several documents have been collected and presented.
33. See those collected in Pietro Vaccari, *Le affrancazioni collettive dei servi della gleba* (Milano: Istituto per gli studi di politica internazionale, 1939).
34. Giovanni Cherubini, *Signori contadini borghesi. Ricerche sulla società italiana del basso Medioevo* (Firenze: La Nuova Italia, 1974), and Giovanni Cherubini, "La proprietà fondiaria nei secoli XV–XVI nella storiografia italiana," *Società e Storia*, I, 1 (1978): 9–34, presented and discussed the sources concerning landownership.
35. See especially Giorgio Giorgetti, *Contadini e proprietari nell'Italia moderna. Rapporti di produzione e contratti agrari dal XVI secolo a oggi* (Torino: Einaudi, 1974) and Giorgio Giorgetti, *Capitalismo e agricoltura in Italia* (Roma: Editori Riuniti, 1977).
36. Labor incomes are often hidden in pre-modern economies, especially in agriculture, and correspond to a part of the total income available to the rural family after payment of the rent. I assume here that wages also bear witness to the trend of the hidden labor income.
37. See the view of evolution proposed by Giorgetti, *Contadini e proprietari nell'Italia moderna*.
38. See especially Francesco Battistini, "La diffusione della gelsibachicoltura nell'Italia centro-settentrionale: un tentativo di ricostruzione," *Società e Storia*, XV (1992): 393–400; Francesco Battistini, "La produzione e il commercio della seta greggia in Italia alla fine del XVIII secolo," *Società e Storia*, XIX (1997): 889–907; Francesco Battistini, *L'industria della seta in Italia nell'età moderna* (Bologna: Il Mulino, 2003); Francesco Battistini, "La produzione, il commercio e i prezzi della seta grezza nello Stato di Firenze 1480–1860," *Rivista di Storia Economica*, n.s., XXI, (2005): 233–272; Francesco Battistini, "Seta ed economia in Italia. Il prodotto 1500–1930," *Rivista di Storia Economica*, n.s., XXV, (2007): 283–318.
39. Anna M. Rapetti, *Campagne milanesi. Aspetti e metamorfosi di un paesaggio rurale fra X e XII secolo* (Cavallermaggiore: Gribaudo, 1994): 99 ff., refers to canals built in the ninth through tenth centuries. See also Domenico Sella, *Crisis and Continuity. The Economy of Spanish Lombardy in the Seventeenth Century* (Harvard: Harvard University Press, 1979): App. C and especially Mauro Ambrosoli, *Scienziati, contadini e proprietari. Botanica e agricoltura nell'Europa occidentale* (Torino: Einaudi, 1992).
40. The abandonment of the least productive soils was, as already seen, the main reason of these satisfactory or even remarkable yields.
41. Giovanni Cherubini, "Le campagne italiane dall'XI al XV secolo", in *Storia d'Italia*, IV, G. Galasso (ed.) (Torino: Utet, 1981): 267–448 supplies a good synthesis of the techniques in late medieval Italian agriculture.
42. The topic has been widely discussed in Giovanni Federico, and Paolo Malanima, "Progress, Decline, Growth: Product and Productivity in Italian Agriculture, 1000–2000," *Economic History Review*, II. s. (2004): 437–464.
43. Sergio Tognetti, "Prezzi e salari nella Firenze tardomedievale: un profilo," *Archivio Storico Italiano*, CLIII (1995): 263–333 puts together the available Tuscan series.
44. The sources for the construction of series of rural wage rates are presented in Malanima, "Wages, Productivity and Working Time in Italy 1300–1913." See the series in the Appendix.
45. When population was rising, probably the volume of agricultural imports was also rising. It represented, in any case, a modest fraction of total production as shown by Maurice Aymard, *Venise, Raguse et le commerce du*

blé pendant la seconde moitié du XVIe siècle (Paris: SEVPEN, 1966), and Fernand Braudel, *La Méditerranée et le monde méditerranéen à l'epoque de Philippe II*, Paris: Colin, 1966) (2nd ed.).

46. The topic is discussed in Malanima, "Wages, Productivity and Working Time in Italy 1300–1913", and Malanima, "The Long Decline of a Leading Economy."
47. In England, by contrast, a drop in wages characterized the thirteenth century as a whole, while in the 50 years before the Black Death wages fluctuated at around the same low level: Campbell, *English Seigniorial Agriculture 1250–1450*: 4–5.
48. A direct calculation of agricultural output is hard or impossible to do for the period we are dealing with. On the method I followed to elaborate the series of per capita agricultural product, see the Appendix to this paper at www.paolomalanima.it.
49. In all these cases, the share of population (such as armies and professional groups) has to be multiplied by a coefficient, to compute the urban population on the whole.
50. In the book by Maria Ginatempo, and Lucia Sandri, *L'Italia delle città. Il popolamento urbano tra Medioevo e Rinascimento (secoli XIII–XVI)* (Firenze, Le Lettere, 1990), data on urban population are presented and discussed for all of Italy in the late Middle Ages. The complete database of Italian cities from 1300 until 1861 is available at www.paolomalanima.it.
51. I come back to the problem of urbanization in section 3.4.
52. As recalled in section 2.4.
53. See especially Joel Mokyr, *The Gifts of Athena. Historical Origins of the Knowledge Economy* (Princeton: Princeton University Press, 2002), and, from an economic perspective, Oded Galor, "From Stagnation to Growth: Unified Growth Theory", in P. Aghion, S. Durlauf (eds.), *Handbook of economic growth* (North Holland, Elsevier: 2005): 171–293. Oded Galor, and David N. Weil, "Population, Technology and Growth: from the Malthusian Regime to the Demographic Transition," *American Economic Review*, 110 (2000): 806–828.
54. See the fine article by C. Marco Belfanti, "Guilds, Patents, and the Circulation of Technical Knowledge. Northern Italy During the Early Modern Age", in *Technology and Culture* (2004): 569–589.
55. On the topic see the articles collected in Giorgio Chittolini (ed.), *La crisi degli ordinamenti comunali e le origini dello stato del Rinascimento* (Bologna: Il Mulino, 1979).
56. I refer to the Italian medieval economic historian.
57. The sources of the graph are the same as the series in Malanima, *L'economia italiana*: 405 (although in this work only decadal series were presented).
58. Battistini, "La produzione, il commercio e i prezzi della seta grezza nello Stato di Firenze 1480–1860" deals with the evolution of this sector.
59. As discussed in Malanima, *L'economia italiana:* App. IV, which shows both the similarities and differences among the available series of building wages. Goldthwaite's work (Richard A. Goldthwaite, *The Building of the Renaissance Florence* (Baltimore and London: The Johns Hopkins University Press, 1980) on the building industry and wages in Florence is still remarkable.
60. The sources for the construction of series of urban wage rates are presented in Malanima, "Wages, Productivity and Working Time in Italy 1300–1913."
61. See, however, the fall in the 1370s and 1380s. On these post-plague decades see the remarks by Munro, *Before and after the Black Death.*
62. By David Abulafia, *The two Italies. Economic Relations Between the Norman Kingdom of Sicily and the Northern Communes* (Cambridge: Cambridge University Press, 1977).

63. Because in the South of Italy many towns are agro-towns, and from the 16th this specific characteristic is much more widespread than before, I use the series of urbanisation in the Centre and North for the following elaboration of non-agricultural production.
64. See David Herlihy, Christiane Klapisch-Zuber, *Les Toscans et leurs familles. Une étude du catasto florentin de 1427* (Paris : Presses Universitaires de la Fondation Nationale des Sciences Politiques, 1978) : passim.
65. Federico-Malanima, "Progress, Decline, Growth: Product and Productivity in Italian Agriculture, 1000–2000,"
66. See the evidence collected by Stephan R. Epstein, *Freedom and Growth. The Rise of States and Markets in Europe, 1300–1750* (London and New York: Routledge, 2000): passim. Still useful is also Sidney Homer, and Richard Sylla, *A History of Interest Rates* (New Brunswick and London, Rutgers University Press, 1991) (1st ed. 1902).
67. On the topic see especially the important works by Richard A. Goldthwaite, "The Empire of Things: Consumer Demand in Renaissance Italy," in *Patronage, Art and Society in Renaissance Italy*, F. W. Kent, P. Simons (eds.) (Oxford: Clarendon Press, 1987): 153–175; Richard A. Goldthwaite, *Wealth and the Demand for Art in Italy 1300–1600* (Baltimore and London: The Johns Hopkins University Press, 1993).
68. The method is fully explained in Malanima, "The Long Decline of a Leading Economy."
69. The topic is discussed by Malanima, *Pre-modern European Economy.*
70. I have used urbanisation rates relating to the Center and North.
71. As we see in the Appendix (col. 2), we have no data on agricultural wages for the decade 1310–20. They are calculated approximately through the rates of increase of the urban wages.
72. The method used to calculate the series is the same as the one already presented by Paolo Malanima, "Measuring the Italian Economy 1300–1861," *Rivista di Storia Economica*, XIX (2003): 265–295, although in the present series (in the Appendix), annual data are elaborated instead of decadal as previously. Data used in Figure 4.10 and the methods used are presented in Malanima, "The Long Decline of a Leading Economy."
73. The fall in the 1370s depends heavily on the Florentine prices and wages used to build the series. On the period, see especially Charles M. De La Roncière, *Prix et salaires à Florence au XIVe siècle* (Roma, Ecole Française de Rome, 1982), and Giuliano Pinto, *Il personale, le balie e i salariati dell'ospedale di San Gallo di Firenze (1395–1406)*, in Id., *Toscana medievale. Paesaggi e realtà sociali* (Firenze: Le Lettere, 1993): 113–149.
74. A comparison is possible on the basis of Angus Maddison, *The World Economy. Historical Statistics* (Paris: OECD, 2003).
75. See especially Jan Luiten Zanden Van, "Una estimacion del crecimiento económico en la Edad Moderna," in *Investigaciones de Historia Economica*, I, (2005): 9–38 both for the comparisons and an alternative (but not so different) reconstruction of the Italian GDP since the Middle Ages. See also Jan Luiten Van Zanden, "Early Modern Economic Growth. A Survey of the European Economy, 1500–1800," in *Early Modern Capitalism*, M. Prak (ed.) (London-New York: Routledge, 2001): 69–87.
76. Goldsmith, *Pre-modern Financial Systems*: Chap. 9; Lodovico Ghetti, *Inventiva d'una imposizione di nuova gravezza*, in G. Roscoe, *Vita di Lorenzo De' Medici detto il Magnifico* (Pisa: N. Capurro, 1816): I, App. 1, written in the 1440s. On Ghetti's data see Goldthwaite¸ *The Building of the Renaissance Florence*, p. 346, and Victor Rutenburg, *A proposito del prodotto lordo fiorentino, un progetto d'imposta del primo Quattrocento,* in *Prodotto*

lordo e finanza pubblica secoli XIII-XIX, ed. by A. Guarducci (Firenze: Le Monnier, 1988): 865–870.

77. A yearly series of per capita output in central and northern Italy in current prices is presented in Malanima, "The Long Decline of a Leading Economy". In the same paper I compare the reconstructed series with direct information relating to the Florentine Republic in 1420–50.
78. In the graph population figures are per decade. Smoothed by means of a mobile average, these are then multiplied for the yearly per capita GDP index.
79. As noticed, for England, by Munro, *Before and after the Black Death*.
80. See, in particular for Tuscany, Maria S. Mazzi, and Sergio Raveggi, *Gli uomini e le cose nelle campagne fiorentine del Quattrocento* (Firenze: Olschki, 1983).
81. Lorenzo Del Panta, *Le epidemie nella storia demografica italiana (secoli XIV–XIX)* (Torino: Loescher: 1986) [1st ed. 1980].
82. Romano, *Tra due crisi: l'Italia del Rinascimento*.
83. The use of the reciprocal allows a clearer representation of the relationships in question.
84. It should be remembered that the subtitle of Carlo Maria Cipolla, "The Decline of Italy: the Case of a Fully Matured Economy," *Economic History Review*, II s., V (1952): 178–187.
85. Giuseppe Parenti, *Prime ricerche sulla rivoluzione dei prezzi a Firenze,* in Id., *Studi di storia dei prezzi* (Paris: Maison des Sciences de l'Homme, 1981) (1st ed. 1939), in his important work on Florentine prices in the sixteenth century already clearly focused on the key factors of the problem.

BIBLIOGRAPHY

Abulafia, D. *The Two Italies: Economic Relations Between the Norman Kingdom of Sicily and the Northern Communes*. Cambridge: Cambridge University Press, 1977.

Alfani, G. "Population et environnement en Italie du Nord au XVIe siècle." *Population* 62 (2007): 667–705.

Allen, R. "Economic Structure and Agricultural Productivity in Europe, 1300–1800." *European Review of Economic History* 4 (2000): 1–26.

Allen, R. "The Great Divergence in European Wages and Prices from the Middle Ages to the First World War." *Explorations in Economic History*, 38, (2001): 411–447.

Ambrosoli, Mauro. *Scienziati, contadini e proprietari. Botanica e agricoltura nell'Europa occidentale*. Torino: Einaudi, 1992.

Aymard, Maurice. *Venise, Raguse et le commerce du blé pendant la seconde moitié du XVIe siècle*. Paris: SEVPEN, 1966.

Battistini, Francesco. "La diffusione della gelsibachicoltura nell'Italia centro-settentrionale: un tentativo di ricostruzione." *Società e Storia*, XV (1992): 393–400.

Battistini, Francesco. "La produzione e il commercio della seta greggia in Italia alla fine del XVIII secolo." *Società e Storia*, XIX, (1997): 889–907.

Battistini, Francesco. *L'industria della seta in Italia nell'età moderna*. Bologna: Il Mulino, 2003.

Battistini, Francesco. "La produzione, il commercio e i prezzi della seta grezza nello Stato di Firenze 1480–1860." *Rivista di Storia Economica*, n.s., XXI, (2005): 233–272.

Battistini, Francesco. "Seta ed economia in Italia. Il prodotto 1500–1930." *Rivista di Storia Economica*, n.s., XXV, (2007): 283–318.
Bellettini, Athos. "La popolazione italiana dall'inizio dell'età volgare ai nostri giorni." In Ruggiero Romano, Corrado Vivanti (eds.), *Storia d'Italia*, 5, I, Torino, Einaudi, (1973): 487–532.
Belfanti, C. Marco. "Guilds, Patents, and the Circulation of Technical Knowledge. Northern Italy During the Early Modern Age." *Technology and Culture*, 2004: 569–589.
Beloch, Karl Julius. *Bevölkerungsgeschichte Italiens*. Berlin-Leipzig, De Gruyter, 1937–1961.
Beloch, Karl Julius. "La popolazione d'Italia nei secoli sedicesimo, diciassettesimo e diciottesimo." In, *Storia dell'economia italiana,* Carlo Maria Cipolla (ed.), I, Torino: Einaudi, 1959.
Boserup, Ester. *The Conditions of Agricultural Growth*. London: Earthscan, 1965.
Braudel, Fernand. *La Méditerranée et le monde méditerranéen à l'epoque de Philippe II*. Paris: Colin, 1966 (2nd ed.).
Breschi, Marco and Malanima, Paolo. "Demografia ed economia in Toscana: il lungo periodo (secoli XIV–XIX)." In *Prezzi, redditi, popolazioni in Italia: 600 anni (dal secolo XIV al secolo XX),* Marco Breschi, Paolo Malanima (eds.), Udine, Forum, 2002: 109–142.
Cammarosano, Paolo. *Le campagne nell'età comunale (metà sec. XI-metà sec. XIV)*. Torino: Loescher, 1974.
Campbell, Bruce M.S. *English Seigniorial Agriculture 1250–1450*. Cambridge: Cambridge University Press, 2000.
Cattaneo, Carlo. *Saggi di economia rurale*. L. Einaudi (ed.). Torino: Einaudi, 1975.
Cherubini, Giovanni. *Signori contadini borghesi. Ricerche sulla società italiana del basso Medioevo*. Firenze: La Nuova Italia, 1974.
Cherubini, Giovanni. "La proprietà fondiaria nei secoli XV-XVI nella storiografia italiana." *Società e Storia*, I, 1978, 1: 9–34.
Cherubini, Giovanni. "Le campagne italiane dall'XI al XV secolo", in *Storia d'Italia*, G. Galasso (ed.), IV, Torino: Utet, 1981: 267–448.
Chittolini, Giorgio (ed.). *La crisi degli ordinamenti comunali e le origini dello stato del Rinascimento*. Bologna: Il Mulino, 1979.
Cipolla, Carlo Maria. "The Decline of Italy: the Case of a Fully Matured Economy", *Economic History Review*, II s., V, 1952: 178–187.
Cipolla, Carlo Maria. "Economic Depression of the Renaissance?" *Economic History Review*, II s., XVI, 1964: 519–527.
Cipolla, Carlo Maria. "Four Centuries of Italian Demographic Development," In *Population in History. Essays in Historical Demographie*, D. V. Glass, D. E. C. Eversley (eds.). London: Edward Arnold, 1965: 570–587.
Clark, Gregory. "Yields per Acre in English Agriculture, 1250–1860: Evidence from Labour Inputs." *Economic History Review*, II s., XLIV, 1991: 445–460.
Coniglio, Giuseppe. "La Rivoluzione dei prezzi nella città di Napoli nei secoli XVI e XVII." In *Atti della IX riunione scientifica della Società Italiana di statistica (Roma, 7–8 gennaio 1950)*, Spoleto, 1952.
Contadini e proprietari nella Toscana moderna, 1, *Dal Medioevo all'Età Moderna*. Firenze: Olschki, 1979.
De La Roncière Charles M. *Prix et salaires à Florence au XIVe siècle*. Roma: Ecole Française de Rome, 1982.
Del Panta, Lorenzo. *Le epidemie nella storia demografica italiana (secoli XIV–XIX)*. Torino, Loescher: 1986 [1st ed. 1980].
Del Panta, Lorenzo, Livi Bacci, Massimo, Pinto, Giuliano, Sonnino, Eugenio. *La popolazione italiana dal Medioevo a oggi*. Bari-Roma: Laterza, 1996.

Epstein, Stephan R. *Freedom and Growth. The Rise of States and Markets in Europe, 1300–1750*. London and New York: Routledge, 2000.
Federico, Giovanni and Malanima, Paolo. "Progress, Decline, Growth: Product and Productivity in Italian Agriculture, 1000–2000." *Economic History Review*, II. s., 2004: 437–464.
Galloway, Patrick R. "Long-Term Fluctuations in Climate and Population in the Preindustrial Era." *Population and Development Review*, 12, 1986: 1–24.
Galor, Oded. "From Stagnation to Growth: Unified Growth Theory", in P. Aghion, S. Durlauf (eds.). In *Handbook of economic growth*, North Holland, Elsevier: 2005: 171–293.
Galor, Oded and Weil David, N. "Population, Technology and Growth: from the Malthusian Regime to the Demographic Transition." *American Economic Review*, 110, 2000: 806–828.
Ghetti, Lodovico. *Inventiva d'una imposizione di nuova gravezza*, in G. Roscoe, *Vita di Lorenzo De' Medici detto il Magnifico*. Pisa: N. Capurro, 1816, I, App. 1.
Ginatempo, Maria and Sandri Lucia. *L'Italia delle città. Il popolamento urbano tra Medioevo e Rinascimento (secoli XIII–XVI)*. Firenze: Le Lettere, 1990.
Giorgetti, Giorgio. *Contadini e proprietari nell'Italia moderna. Rapporti di produzione e contratti agrari dal XVI secolo a oggi*. Torino: Einaudi, 1974.
Giorgetti, Giorgio. *Capitalismo e agricoltura in Italia*. Roma: Editori Riuniti, 1977.
Goldsmith, Raymond W. *Pre-modern Financial Systems. A Historical Comparative Study*. Cambridge: Cambridge University Press, 1987.
Goldsmith, Raymond W. and Zecchini, Salvatore. "The National Balance Sheet of Italy (1861–1973)." *Rivista di Storia Economica*, n.s., XV, 1999: 3–20.
Goldthwaite, Richard A. *The Building of the Renaissance Florence*, Baltimore and London: The Johns Hopkins University Press, 1980.
Goldthwaite, Richard A. "The Empire of Things: Consumer Demand in Renaissance Italy." In *Patronage, Art and Society in Renaissance Italy*, F. W. Kent, P. Simons (eds.), Oxford: Clarendon Press, 1987: 153–175.
Goldthwaite, Richard A. *Wealth and the Demand for Art in Italy 1300–1600*. Baltimore and London: The Johns Hopkins University Press, 1993.
Goldthwaite, Richard A. *The Economy of Renaissance Florence*. Baltimore: Johns Hopkins University Press, 2009.
Herlihy, David. *Medieval and Renaissance Pistoia: the Social History of an Italian Town, 1200–1430*. New Haven: Yale University Press, 1967.
Herlihy, David, Klapisch-Zuber, Christiane. *Les Toscans et leurs familles. Une étude du catasto florentin de 1427*. Paris : Presses Universitaires de la Fondation Nationale des Sciences Politiques, 1978.
Homer, Sidney and Sylla, Richard. *A History of Interest Rates*. New Brunswick and London: Rutgers University Press, 1991 (1st ed. 1902).
Levi, Giovanni. "L'energia disponibile." In *Storia dell'economia italiana,* R. Romano (ed.), Torino: Einaudi, II, 1991: 141–168.
Livi Bacci, Massimo. *La popolazione nella storia europea*. Roma-Bari: Laterza, 1998.
Lo Cascio, Elio and Malanima, Paolo. "Cycles and Stability. Italian Population Before the Demographic Transition (225 B.C.–A.D. 1900)." *Rivista di Storia Economica*, n.s., 2005, XXI, 3: 5–40.
Lopez, Roberto S., Miskimin, Harry A. "The Economic Depression of the Renaissance." *Economic History Review*, II s., XIV, 1962: 408–426.
Maddison, Angus. *The World Economy. Historical Statistics*. Paris: OECD, 2003.
Malanima, Paolo. *Aspetti di mercato e prezzi del grano e della segale a Pisa dal 1548 al 1818*. In M. Mirri (ed.), *Ricerche di Storia Moderna,* I, Pisa, Pacini,

1976 (monthly original data of agricultural products on which the article was based are now available at www.iisg.nl).
Malanima, Paolo. *La fine del primato. Crisi e riconversione nell'Italia del Seicento*. Milano: Bruno Mondadori: 1998.
Malanima, Paolo. *Risorse, popolazioni, redditi: 1300–1861*, in *Storia economica d'Italia*, Pierluigi Ciocca, Gianni Toniolo (eds.), Roma-Bari: Laterza, 1999, 1, 43–124.
Malanima, Paolo. *L'economia italiana. Dalla crescita medievale alla crescita contemporanea*. Bologna: Il Mulino, 2002.
Malanima, Paolo. "Measuring the Italian Economy 1300–1861." *Rivista di Storia Economica*, XIX, 2003: 265–295.
Malanima, Paolo. "Urbanisation and the Italian Economy During the Last Millennium." *European Review of Economic History*, 9, 2005: 97–122.
Malanima, Paolo. "Wages, Productivity and Working Time in Italy 1300–1913." *Journal of European Economic History,* 36, 2007: 127–174.
Malanima, Paolo. *Pre-modern European Economy. One Thousand Years (10th–19th Centuries)*. Leiden-Boston: Brill, 2009.
Malanima, Paolo. "Decline or Growth? European Cities and Rural Economies 1300–1600." *Jahrbuch für Geschichte des ländlichen Raumes,* 6, 2009: 18–44.
Malanima, Paolo. "The Long Decline of a Leading Economy. GDP in Central and Northern Italy 1300–1913." *European Review of Economic History* (forthcoming).
Mangini, A., Spötl, C., Verdes, P. "Reconstruction of Temperature in the Central Alps During the Past 2000 years." *Earth and Planetary Science Letters*, 235, 3–4, 2005: 741–51.
Mann, Michael E. "Medieval Climatic Optimum." In *The Earth System: Physical and Chemical Dimensions of Global Environmental Change*, 1, in, *Encyclopedia of Global Environmental Change*, T. Munn (ed.). Chichester: Wiley, 2002: 514–516.
Mann, Michael E., Bradley R. S., Hughes M. K. "Northern Hemisphere Temperatures During the Past Millennium: Inferences, Uncertainties, and Limitations." *Geophysical Research Letters*, 26, 1999: 759–762.
Mann, Michael E. and Jones P. D. "Global Surface Temperatures over the Past two Millennia." *Geophysical Research Letters*, 30, n. 15, August, 2003.
Mazzi, Maria S. and Raveggi, Sergio. *Gli uomini e le cose nelle campagne fiorentine del Quattrocento*. Firenze: Olschki, 1983.
Mokyr, Joel. *The Gifts of Athena. Historical Origins of the Knowledge Economy*. Princeton: Princeton University Press, 2002.
Montanari, Massimo. *L'alimentazione contadina nell'alto Medioevo*. Napoli: Liguori, 1979.
Montanari, Massimo. *Rese cerealicole e rapporti di produzione*. In Id., *Campagne medievali*. Torino: Einaudi, 1984: 54–85.
Montanari, Massimo. *La società medievale di fronte alla carestia*, in Id., *Campagne medievali*. Torino: Einaudi, 1984: 191–200.
Munro, John. *Before and after the Black Death: Money, Prices, and Wages in Fourteenth-Century England*. Department of Economics, University of Toronto, Working Paper n. 24, 2004.
Parenti, Giuseppe. *Prime ricerche sulla rivoluzione dei prezzi a Firenze,* in Id., *Studi di storia dei prezzi*. Paris: Maison des Sciences de l'Homme, 1981 (1st ed. 1939).
Pini, Antonio I., *Città, comuni e corporazioni nel medioevo italiano*, Bologna, Clueb, 1986.
Pinto, Giuliano. *Firenze e la carestia del 1346–47*, in Id., *La Toscana nel tardo Medioevo. Ambiente, economia rurale, società*. Firenze: Sansoni, 1982: 333–379 (1st ed. 1972).

Pinto, Giuliano. *Il personale, le balie e i salariati dell'ospedale di San Gallo di Firenze (1395–1406).* In Id., *Toscana medievale. Paesaggi e realtà sociali,* Firenze: Le Lettere, 1993.
Porisini, Giorgio. *Produttività e agricoltura: i rendimenti del frumento in Italia dal 1815 al 1922*. In "Archivio dell'Unificazione Italiana", XX, 1971.
Rapetti, Anna M. *Campagne milanesi. Aspetti e metamorfosi di un paesaggio rurale fra X e XII secolo*. Cavallermaggiore: Gribaudo, 1994.
Romano, Ruggiero. *Tra due crisi: l'Italia del Rinascimento*. Torino: Einaudi, 1971.
Romano, Ruggiero. *Paese Italia. Venti secoli di identità*. Roma: Donzelli, 1997.
Rutenburg, Victor. *A proposito del prodotto lordo fiorentino, un progetto d'imposta del primo Quattrocento*. In A. Guarducci (ed.), *Prodotto lordo e finanza pubblica secoli XIII–XIX*. Firenze: Le Monnier, 1988: 865–870.
Sapori, Armando. *Il Rinascimento economico*, in *Studi di storia economica (secoli XIII–XIV–XV)*. Firenze: Sansoni, 1982 (1st ed. 1952): I, 618–652.
Sella, Domenico. *Crisis and Continuity. The Economy of Spanish Lombardy in the Seventeenth Century*. Harvard: Harvard University Press, 1979.
Storia d'Italia. R. Romano, C. Vivanti (eds.). Torino: Einaudi, 1972 ff.
Svimez. *Un secolo di statistiche italiane. Nord e Sud 1861–1961*. Roma: Svimez, 1961.
Tognetti, Sergio. "Prezzi e salari nella Firenze tardomedievale: un profilo." *Archivio Storico Italiano*, CLIII, 1995: 263–333.
Vaccari, Pietro. *Le affrancazioni collettive dei servi della gleba*. Milano: Istituto per gli studi di politica internazionale, 1939.
Violante, Cinzio. *La società milanese nell'età precomunale*. Roma-Bari: Laterza, 1981 (1st ed. 1953).
Zanden Van, Jan Luiten. "Early Modern Economic Growth. A Survey of the European Economy, 1500–1800." In *Early Modern Capitalism*, M. Prak (ed.). London-New York: Routledge, 2001: 69–87.
Zanden Van, Jan Luiten. "Una estimacion del crecimiento económico en la Edad Moderna." *Investigaciones de Historia Economica*, I, 2005: 9–38.